

Technical Management Team

2001 WATER MANAGEMENT PLAN

For The Federal Columbia River Power System

27 June 2001

I. Introduction

This Water Management Plan (Plan) describes the measures needed in 2001 to provide the fish passage conditions called for in the National Marine Fisheries Service (NMFS) Biological Opinion (BiOp), *Reinitiation of Consultation on Operation of the Federal Columbia River Power System (FCRPS), Including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin*, dated 21 December 2000, and in the U.S. Fish and Wildlife Service (USFWS) BiOp, *Effects to Listed Species from Operations of the FCRPS*, dated 20 December 2000. It covers relevant factors affecting the operation of FCRPS, including federal reservoir and dam operations to augment flows for fish, power generation, turbine outage and spill scheduling, water temperature management; total dissolved gas (TDG) management, and special operation for research and other purposes. The Plan is normally updated annually by April 15th of each year by the Technical Management Team (TMT). It is consistent with the TMT Guidelines and gives full consideration to the provisions of and effects on the Northwest Power Planning Council's Fish and Wildlife Program, other BiOps, state and tribal plans and programs, the Endangered Species Act (ESA), the Clean Water Act (CWA), and other operational requirements. Appropriate measures resulting from ongoing NMFS consultation with the U.S. Bureau of Reclamation (BOR) on operation of upper Snake River projects will be considered for inclusion upon completion of that consultation.

The BiOps call on the Action Agencies to develop 1- and 5-year implementation plans encompassing each major salmon recovery program area, including water management. This Plan serves as a transition 1-year water management plan to begin implementing the new BiOps. The time period of this Plan is 1 October 2000 through 30 September 2001. This time frame is also consistent with the hydrologic Water Year. The 2002 1-year Plan will be completed by 1 September 2001. Also, a 5-year Plan will be prepared

by the end of June 2001 and included in the overall Action Agency Implementation Plan. Six appendices are attached to the Plan:

- Appendix 1. Dissolved Gas Management Plan
- Appendix 2: Emergency Protocols
- Appendix 3: Load Shaping Guidelines for Turbine Operation Outside 1% Peak Efficiency
- Appendix 4: TMT Guidelines
- Appendix 5: Maintenance Schedule Outages of Generating Units
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II. Water Supply Forecasts

The (June Final) January - July forecast for the Columbia River at The Dalles is 55.5 million acre-feet (MAF), 52% of normal. Runoff forecasts for Reclamation reservoirs above Brownlee are in the 33 - 78 percent of normal range. Pertinent water supply forecasts issued by the River Forecast Center are summarized in Table 1 for key locations and time periods (sited in the BiOps) on the Columbia and Snake Rivers. The final observed water supply for 2000 is also given for comparison purposes.

Table 1. June Final 2001 Runoff Volume Forecasts That Are Referenced in the BiOps, and 2000 Actual Runoff Volumes.

Location	April Early '01	% of Normal April Early '01	2000 (actual)	% of Normal 2000 (actual)
	MAF	%	MAF	%
Libby (Apr-Aug) *	3.16	50%	5.50	86%
Hungry Horse (Apr-Aug) #	1.20	57%	1.91	90%
Lower Granite (Apr-Jul)	10.8	50%	17.2	79%
The Dalles (Apr-Aug)	49.0	53%	84.3	90%

(*) Should use COE Forecast (June Final)

(#) BOR Forecast

III. Objectives, priorities, and decision criteria for various water conditions.

The NMFS BiOp states that the Plan will contain system operational objectives, priorities, and decision criteria that will apply to various water conditions (Section 9.4.2.2, page 9-28). This section defines goals and objectives developed by TMT over the past year, and which will be used by TMT in 2001 as overall guidance in making

operational recommendations to the Action Agencies. This includes operating criteria and priorities developed by the Federal agencies in joint IT/TMT and executive level meetings during February and March 2001, and shown below.

**Federal Agencies' Criteria and Priorities for 2001 FCRPS Operations
March 30, 2001**

BACKGROUND

Poor water conditions in the Columbia River basin coupled with an extraordinary power market on the West Coast have caused an unprecedented river management situation this year. In recognition of obligations to operate FCRPS projects to meet multiple purposes consistent with: (1) authorizing legislation, (2) additional laws including the Endangered Species Act (ESA), the Clean Water Act (CWA), Pacific Northwest Electric Power Planning and Conservation Act, Reclamation Laws, and cultural resource laws such as the National Historic Preservation Act and the Native American Grave Protection and Repatriation Act, (3) treaties and executive orders with Pacific Northwest Indian tribes and the Federal Government's trust responsibilities, and (4) existing Biological Opinions for the operation of hydroelectric reservoir projects in the FCRPS and the marketing and transmission of power from those projects, these principles are proposed by the regional offices of the following federal agencies: Bonneville Power Administration, U.S. Army Corps of Engineers, Bureau of Reclamation, National Marine Fisheries Service, U.S. Fish and Wildlife Service, and Environmental Protection Agency. These principles recognize that achieving the objectives of the system's multi-purpose operation this year is made more difficult by the continuing poor water conditions, and that the unprecedented power market conditions this year may result in emergency operations of the FCRPS. The six Federal agencies agree to seek consensus on emergency operations that minimize variations from the operations described in existing Biological Opinions, by considering priorities for fish operations to minimize effects on listed and unlisted fish populations, and to seek offsetting measures sufficient to achieve the objectives of the Opinions.

Existing Biological Opinions recognize that water management actions may change due to unforeseeable power system, flood control or other emergencies. Emergencies may include a power emergency; one based on insufficient power supply to meet demand in the Pacific Northwest. There may also be West Coast demand involving health and human safety that requires an emergency response. Emergency actions should be viewed as a last resort, and will not be used in place of long-term investments necessary to allow full, uninterrupted implementation of the required reservoir operations while maintaining other project purposes, such as an adequate and reliable power system.

It is recognized that federal agencies may, through adaptive management, adjust FCRPS operations over time, as there are deteriorating or improving changes in circumstances, for example water supply, economic outlook, power market conditions, conditions affecting listed fish, fish and wildlife, water quality, cultural resources, or project uses. Continued coordination will ensure federal agencies have current information and appropriate input from all interested parties on which to base their decisions.

These principles are not intended to and do not alter or affect the statutory and other legal rights, authorities, responsibilities, and obligations of the federal agencies and the right and authority to interpret and implement other statutory authority. These principles are intended only to improve the coordination of the federal agencies in their management of the FCRPS, and are not intended to, nor do they create any right, benefit, or new trust responsibilities, substantive or procedural, enforceable at law or equity by a party against the United States, its agencies, its officers, or any person.

ACTIONS PRECEDING AND DURING A POWER SYSTEM EMERGENCY DECLARATION

In order to meet Pacific Northwest load requirements, the following actions will be taken prior to declaring and throughout a power system emergency:

1. Provide for voluntary conservation;
2. Implement conservation measures, to the extent possible;
3. Exercise contract provisions that reduce firm load obligations;
4. Pursue purchase of load reductions consistent with criterion 3 below;
5. Pursue purchases consistent with criterion 3 below; and
6. Pursue acquisition of irrigation pumping load consistent with criterion 3 below;

POWER EMERGENCIES: CRITERIA AND PROCESS

Assuming an adjustment in FCRPS operations is required to maintain the reliability of the FCRPS, the following criteria will be used for determining a risk to reliability and a declaration of a power emergency. The criteria are:

1. Operational Power System Reliability due to near-term insufficiency. Defined as insufficiency of electrical generation to meet Pacific Northwest electrical near-term demand. An indicator of resource scarcity may be a quick rise in prices over a few hours or days.
2. Planning Power System Reliability due to a forecasted insufficiency. The reliability criterion is exceeded when the probability of insufficient generation to meet load exceeds 5% for any of the next 12 months.

3. Power System Reliability due to inadequate reserves to acquire sufficient electrical generation and maintain other BPA funded activities, including programs to protect, mitigate and enhance fish and wildlife.
The financial criterion for a power system emergency is exceeded when the probability of FCRPS financial reserves being \$0 or less after meeting all expected financial obligations exceeds 20% for any of the next 12 months.

These planning criteria will be estimated using statistical distributions of estimated future values for streamflows, revenues, power prices and similar inputs to cashflows, and will also take into account expected benefits of tools which are reliably available to mitigate cashflow problems, such as monthly 4(h)(10)(c) credits.

All power emergencies will be declared consistent with TMT's Interim Protocols for Emergency Operations dated September 22, 2000, or as subsequently amended, including, as soon as practicable, notice to states and tribes. The Protocols may be found at:

<http://www.nwd-wc.usace.army.mil/TMT/2000/ManPlan/emerprotocl0922.PDF>.

FISHERY OPERATIONS PRIORITIES FOR 2001

1. Recognizing conditions may change, the following are the priorities for fishery operations for January through August of 2001.
 - a) *Power/Chum Flows through a minimum of 65% emergence*
 - b) *Full fish transportation in the Snake River*
 - c) *Transport evaluation from McNary Dam in the spring*
 - d) *Balance spring spill operations for ESA listed stocks (wild and hatchery) at mainstem FCRPS dams with uncertainty associated with volume forecast error*
Allocate any spill available within the following project priority
 - i) *The Dalles (with a consistent operation for study purposes)*
 - ii) *Bonneville*
 - iii) *John Day*
 - iv) *McNary*
 - v) *Ice Harbor*
 - e) *Lower Granite surging operation targeted to move fish through pool to Lower Granite*
 - f) *Balance summer flow augmentation (June 30 refill) and spring spill operations*
 - i) *Refill of Dworshak has highest priority for providing fish flow and water quality benefits*
 - ii) *Ensure sufficient water in Hungry Horse and Libby to provide bull trout minimum flows*
 - g) *Minimum Operating Pool on the Snake River and John Day within 1½ foot of minimum level for irrigation pumping.*

- h) *Balance Vernita Bar protection level and Grand Coulee Elevation*
Consider reducing protection flows if the reduced protection flows, combined with forecasts of BPA loads or streamflows below Grand Coulee provide a high confidence of benefit in Grand Coulee elevation
 - i) Summer spill operations at mainstem FCRPS dams for ESA listed stocks (wild and hatchery)
 - j) Targeted spring spill for non-listed hatchery releases
 - k) Targeted summer spill for non-listed hatchery releases
 - l) Spring system flow augmentation, with emphasis on May
2. Monitor and evaluate (with EPA technical assistance) and consider effects on water quality and any applicable water quality standards, in determining priorities.
 3. Convene TMT to seek input on the timing of implementation and provide greater definition to these priorities, with elevation to Implementation Team or Regional Federal Executives, as necessary.

(Italics indicate operations that have already been implemented and completed.)

Some Italics added to original statement to show actions implemented and completed by June 15.

IV. Winter Operations (October 2000 - March 2001)

Reservoir Refill

During the winter season leading up to the 2001 fish passage season, the Federal projects were operated in order to provide protection for the chum salmon redds below Bonneville Dam and to provide necessary flows for power generation **to meet regional load needs. during power system emergencies.** The chum flow operation ended this year on 0700 March 16th. We also kept in mind the goal of meeting the BiOp's recommendations on reservoir refill, **but when each month brought yet another diminishing water supply forecast it became clear that the reservoirs would not achieve their upper rule curve goals.** . The BiOp's **is** goal is to achieve the levels of confidence of refill summarized in Table 2 to the April 10th flood control elevation at Grand Coulee, and the April 20th flood control elevation at Libby, and Hungry Horse. A 59-year modeling run is routinely used to predict the expected refill probability of each of the reservoirs involved. Because of the low water supply forecasts this year no modeling run was made this year.

Table 2. Required Confidence Levels for Reservoir Refill (Source: 2000 BiOp)

Libby and Hungry Horse	Grand Coulee
75%	85%

The maximum flood control draft varied at each project. The timing of the maximum draft also varied for each project. Table 3 provides the 2001 maximum flood control requirements at each project and the date of maximum draft at each project.

Table 3. Flood Control (FC) Requirements (*based on June 2001 final forecast*)

Projects	Date of Max. FC Draft	Max. FC Draft Elev.	Min. Pool Elevation	Max. Pool Elevation
Mica	31 January	527*	2320.0	2475.0
Arrow	31 January	1431.1	1377.9	1444.0
Duncan	28 February	1833.7	1794.2	1892.0
Libby	31 Jan	2415.3	2287.0	2459.0
Hungry Horse	30 April	3551.8#	3336.0	3560.0
Albeni Falls	14 Nov	2053.07 ##	2051.0	2062.5
Grand Coulee	31 Mar	1283.3	1208.0	1290.0
Brownlee	31 January	2077	1976.0	2077.0
Dworshak	31 January	1537.1	1445.0	1600.0

(*) in kaf. Mica flood control evacuation requirements are defined in kaf space required rather than a corresponding elevation in feet.

(#) VARQ From BOR

Albeni Falls draft limited to 2053 by court agreement.

Reservoir and Reservoir-Related Operations

Libby. Libby ended August with an elevation of 2434.89 feet. Libby was operated for power in the September through December period, and for refill and power needs in the January-March period. In early November outflow from Libby was increased to provide additional generation due to a cold snap power emergency. Outflows from Libby were also increased in early December because of a power system emergency. Libby was on minimum outflow of 4 Kcfs from the beginning of January until January 22nd when outflow was again increased to help with the power emergency. Libby returned to minimum flow March 8th and remained at minimum flow until March 27th when flow was increased to 4.5 Kcfs in order to return some water to Canada. Libby has been on minimum flow since April 4th. The end of December flood control target was elevation 2411 feet. Because of the low inflows during the winter it was possible to provide low flows of 4 Kcfs for the burbot Study. Libby's end of December elevation was 2411.45 feet. The ends of January, February, March and April flood control

elevation targets were 2415.3, 2435.3, 2448, and 2448 feet respectively based on each respective water supply forecast. Libby's end of January, February, March, and April elevations were 2405.79 (9.5 feet below flood control), 2391.17, 2387.59 and 2387.02 feet respectively. The BiOp's objective is to achieve the April 15th flood control evacuation point with 75% confidence.

Hungry Horse. Hungry Horse ended August at elevation 3539.75 feet. End of January, February, and March and April elevations were 3509.94, 3498.64, 3491.34, and 3490.87 feet respectively. It continued to draft up until April 24th when it began to fill. Hungry Horse operated during the spring to meet minimum instream flow targets at Columbia Falls and occasional power releases. The minimum flow requirement at Hungry Horse, based on April – August volume forecast was 500 cfs this spring. Hungry Horse will be operating according to VARQ flood control this year.

Albeni Falls. Albeni Falls ended August with an elevation of elevation of 2062.31 feet. The lake was drafted to elevation 2060.01 feet by September 30th. In an agreement reached the end of October, the decision was made for the lake to be drafted no lower than to elevation 2053 – 2053.5 feet during the winter. The operating range was changed to 2053 – 2054 feet at the end of December. Albeni Falls began filling May 4th.

Grand Coulee. Grand Coulee started September at elevation 1280.1 feet. It ended September at elevation 1285.5 feet. Grand Coulee reached its highest winter elevation toward the end of October of 1287.3 feet. Between October and the middle of April Grand Coulee was drafted in order to produce power and to maintain the minimum discharge requirements for chum below Bonneville and Venita Bar protection flows while inflows to Lake Roosevelt receded. The chum operation ended 0700 March 16th. In January the end of month elevation was 1241.3 (48.7 feet below flood control) the flood control elevation was 1290 feet. The project ended February at an elevation of 1227.3 with a flood control elevation of 1290 feet. The project continued to draft until the middle of April with its lowest midnight elevation being 1216.7 midnight April 20th. It ended March and April with an elevation of 1222.70, and 1221 feet respectively. In early June, Grand Coulee was operated to provide the highest possible flows for juvenile fish protection in the middle and lower Columbia River while targeting an end of June elevation of 1280 or higher.

Brownlee. Brownlee ended August with an elevation of 2047.22 feet. It ended September at elevation 2039.65 feet and continued to draft until the early part of October at which point it began to fill. Brownlee reached a maximum elevation of 2073.73 feet January 14th. Brownlee drafted until the middle of February when it began to fill. Brownlee's end of January, February, March and April flood control elevations were 2077.0, 2077, 2077, and 2077 feet respectively based on each respective water supply forecast. Brownlee's end of January, February, March and April elevation were 2067.87 feet (9.1 feet below flood control), 2069.04, 2073.66, and 2075.68 feet respectively. Since May Brownlee has been passing inflow and operating in the top foot.

Upper Snake River. Reclamation's reservoirs in the upper Snake River continued to draft for irrigation through October 2000. Releases were then set to winter minimums. Irrigation demands and augmentation releases during the previous summer and fall caused many reservoirs to be well below their winter flood control space requirements for 2001. . With a below average snowpack in 2001, the upper Snake reservoirs released minimum flows until irrigating season began. Flood control requirements did not impact reservoir releases in 2001.

Dworshak. Dworshak ended August at an elevation of 1520.07 feet. At the beginning of September Dworshak went to minimum project release (around 1500+ cfs because of gas standards). It kept this level of outflow (except for some higher flows for unit testing until December 10th when it went to full load because of the power emergency. Dworshak went back to minimum flow on December 13th. Dworshak again kept releasing project minimum until January 22nd when it increased flow for the power emergency. Dworshak went back to minimum flow on February 3rd. Dworshak again increased outflows from February 13th to the 19th for a power emergency. It has been on minimum flow since then. The end of January, February, March and April flood control elevations were 1537.1, 1566.3, 1581.8, and 1597.4 feet respectively based on each respective water supply forecast. Dworshak's end of January, February, March, and April elevation were 1507.92 feet (29.2 feet below flood control), 1502, 1512.29, 1531.54 feet respectively.

Lower Snake River Projects. Due to seepage problems at the western Lewiston Levee Lower Granite forebay elevation was restricted to maintain the elevation at Lewiston no higher than 735 feet through February 28. Little Goose, Lower Monumental, and Ice Harbor projects operated within the normal operating range after August except for several forebay exceedances which were needed to assist with several power emergencies.

Bonneville. Bonneville's outflow was controlled to provide protection for spawning Chum and Fall Chinook. The minimum flow level was set at 125 kcfs 30 October. The protection level was set at 130 – 135 Kcfs November 24th. The protection level was set to 135 – 140 Kcfs December 5th. On January 5th the constraint was changed to a 12 foot minimum tailwater elevation. This was done in order to allow a lower flow to save water while still providing protection for most of the redds. The minimum tailwater elevation was reduced to 11.7 feet January 10th. The minimum tailwater elevation was further reduced to 11.5 feet March 3rd. On March 7th the nighttime minimum tailwater level was reduced to 11.3 feet and on March 12th the daytime minimum tailwater elevation was also reduced to 11.3 feet. Protection was provided until 0700 March 16th when the operation was stopped.

Winter Flood Control Operational Strategy.

The Corps' flood control guidance technical document can be found on the web at <http://www.nwd-wc.usace.army.mil/report/colriverflood.htm>. The calculated flood evacuation at each reservoir is an upper limit reservoir elevation for the end of that month. During January and February variances to operate a project slightly above its end of month flood control elevation are examined on a case-by-case basis as requested by the project owner. Depending upon the hydrologic conditions at the time of the request, the request may be granted. The April 30th flood control upper limit has high system flood control value, since it is just prior to the start of the freshet and the spring refill period. Refill is initiated either by the system flood control operation necessary to meet the initial controlled flow at The Dalles, or to meet assured refill criteria.. Since the end of January all flood control projects have been well below their flood control requirements. The system was operated since January to meet power needs and support chum flows below Bonneville Dam.

V. Spring Operations (April-June)

Spring Flow Objectives at Lower Granite and McNary

The spring flow objectives at Lower Granite and McNary are to be calculated based on the April final volume runoff forecast, using a sliding scale defined in the BiOp. Values shown in Table 4 resulted from the April final runoff forecasts (April-July runoff forecast of 10.0 MAF at Lower Granite and April – August runoff forecast of 49.6 MAF at The Dalles).

Table 4. BiOp Spring Flow Objectives (based on April final runoff forecast)

Lower Granite		McNary	
Period	Flows (kcfs)	Period	Flows (kcfs)
4/3-6/20	85	4/20-6/30	220

Because of the low water supply conditions this year the FCRPS ~~did will~~ not ~~achieve be at~~ their April 10th flood control elevations. ~~Consequently t~~There ~~waswill be very~~ little ~~to or~~ no water released for spring flow augmentation. Some water was released from Grand Coulee to improve river conditions in the middle and lower Columbia River for juvenile fish. The federal actions agencies's goal ~~was toat this time to~~ try and refill Dworshak, Libby and Hungry Horse to within 20 feet from full around June 30th.

Spring Flow Objective for the Mid-Columbia River

The recommended average flow objective at Priest Rapids is 135 kcfs during the April 10th - June 30th period. One of the objectives to be decided this year is should the Venita Bar flows of 65 kcfs be kept until emergence. This year a daily average flow level of greater than 65 kcfs was maintained until May 8th for Venita Bar redd protection during fall chinook emergence.

Snake Reservoirs at MOP

The lower Snake River reservoirs will be operated within one foot of the minimum operating pool (MOP) from 12 April 2001 until adult fall chinook salmon begin entering the lower Snake River (late August). In 2001 it will not be possible to operate at MOP at Lower Granite and Ice Harbor due to navigation concerns. This is because maintenance dredging did not occur on the lower Snake River during the winter due to ESA concerns about impacts on listed fish species. The operating ranges are shown in Table 5.

MOP draft and refill operations will be determined by TMT and done in a manner that provides fish benefits, while avoiding exceedence of state TDG standards, if possible. This will be accomplished through proper timing of the draft at each individual reservoir, proper sequencing of the operation, and controlling the draft rate. Detailed draft operations ~~was will be~~ discussed in-season.

Table 5. Lower Snake River Reservoirs Operating Ranges

Reservoirs	MOP Range (ft)	Normal Operating Range (ft)
Lower Granite	734 - 735 734-735.5 *	733 – 738
Little Goose	633 - 634	633 - 638
Lower Monumental	537 - 538	537 - 540
Ice Harbor	438 - 439	437 - 440

* Lower Granite upper limit of MOP operation raised .5 feet May 2nd in order to provide BPA with more flexibility to minimize flow reductions until after midnight.

Other Reservoir Spring Operation

Sturgeon Flows from Libby.

The Sturgeon flows provided from Libby are set according to the 2000 USFWS BiOp, based on the April - August volume runoff forecast at Libby. This year's April – August forecast at Libby is 3.16 MAF based on the latest Corps of Engineer's forecast. At this forecast amount sturgeon flows are not requested. Also at this forecast level minimum bull trout flows between sturgeon and salmon flows are set at a level of 6 kcfs.

Canadian Treaty projects will operate consistent with the 2000-2001 Detailed Operating Plan (DOP) and related operating agreements such as the Non-Power Uses Agreement and the Non Treaty Storage Agreement. The Operating Rule Curve for the whole of Canadian Storage shall be the sum of the Operating Rule Curves for each of Duncan, Arrow, and Mica. Mica will operate consistent with the Mica Project Operating Criteria table as shown in the DOP. More detailed information on the DOP will be available via the TMT homepage.

Spring Spill for –fish passage

Because of the low water supply there ~~was~~~~will~~~~be~~ no spill for juvenile fish at the three Lower Snake collector projects (Lower Granite, Little Goose, and Lower Monumental). The full BiOp spill levels will not be provided at the other projects. The Federal Agencies' Criteria and Priorities for 2001 FCRPS Operations have set the following priorities for spill first The Dalles (with a consistent operation for study purposes) then Bonneville, John Day, McNary, and Ice Harbor.

Planning dates for spring spill are April 3rd to June 20th in the Snake River and April 10th to June 30 in the lower Columbia River. A summary of the general guidance on spill requirements and other considerations provided in the 2000 NMFS BiOp is listed in Table 6. This includes spill up to the level of 120% TDG in tailraces and 115% at forebays of the next project downstream. ~~Only one in-season adjustments~~ of the spill caps ~~was~~~~will~~~~be~~ made ~~at Bonneville Dam~~ based on actual TDG levels measured below the projects ~~and it is described below~~.

~~If needed~~ ~~To~~ provide the best condition for an evaluation of the effects and efficacy of spill to improve in-river survival, the TMT ~~may~~ recommended that a single spill regime prevail throughout the spring migration season. This action ~~will~~ depended on when the numbers of fish arrived~~ing~~ at the projects ~~are significant~~ and when the flows ~~are expected to~~ reached trigger levels during the spring season.

This year spring spill for juvenile fish passage began May 16th at Bonneville and The Dalles. The spill level at Bonneville was 50 kcfs 24 hours a day. Spill at Bonneville was stopped for several hours May 24 in an attempt to reduce high TDG readings at Camas. At The Dalles the spill level was 30% of project outflow 24 hours a day. From May 22nd to May 25th the daytime spill level was held at a constant value (between 30% and 40% of total outflow) to support juvenile fish testing. At John Day and McNary spill for juvenile fish passage began May 25th. The spill level at John Day was 30% of project outflow from 1800 – 0600 each day. (On the last day of spill the spill started at 1900). At McNary the spill level was 30 kcfs from 1800 – 0600 every other day. The reason for the every other day spill was to avoid spilling on days that fish were being collected at McNary. Spring spill for juvenile fish passage was stopped at midnight June 15th when the power lost from spill was estimated to reach 600 MW months.

At Bonneville and McNary new spill patterns were used this year to improve juvenile fish conditions.

Ice Harbor spilled for 6 hours May 19th due to a juvenile fish transport barge having to release fish in the forebay.

Table 6. Summary of Spill Requirements and Other Considerations (2000 NMFS BiOp) from **Table 9.6-3**. Estimated spill levels and gas caps for FCRPS projects during spring (all) and summer (nontransport projects). Note spill levels adjusted to current total dissolved gas caps (set last summer)

Project ¹	Estimated Spill Level ²	Hours	Limiting Factor
Lower Granite	60 kcfs	6 p.m. - 6 a.m.	gas cap
Little Goose	42 kcfs	6 p.m. - 6 a.m.	gas cap
Lower Monumental	27 kcfs	24 hours	gas cap
Ice Harbor	105 kcfs (night) 45 kcfs (day)	24 hours	nighttime - gas cap daytime - adult passage
McNary	170 kcfs	6 p.m. - 6 a.m.	gas cap
John Day	140 kcfs/60% ³ (night)	6 p.m. - 6 a.m. ⁴	gas cap/percentage
The Dalles	40% of instant flow	24 hours	tailrace flow pattern and survival concerns (ongoing studies)
Bonneville	105 kcfs (night) 75 kcfs (day)	24 hours	

Notes

¹ Summer spill is curtailed beginning on or about June 20 at the four transport projects (Lower Granite, Little Goose, Lower Monumental, and McNary dams) due to concerns about low inriver survival rates.

² Estimated spill levels shown in the table will increase for some projects as spillway deflector optimization measures are implemented.

³ The TDG cap at John Day Dam is estimated at 85 to 160 kcfs, and the spill cap for tailrace hydraulics is 60%. At project flows up to 300 kcfs, spill discharges will be 60% of instantaneous project flow. Above 300 kcfs project flow, spill discharges will be at the gas cap (up to the hydraulic limit of the powerhouse).

⁴ Spill at John Day Dam will be 7:00 p.m. to 6:00 a.m. (night) and 6:00 a.m. to 7:00 p.m. (day) between May 15 and July 31.

VI. Summer Operations (July-August)

Summer Flow Objective at Lower Granite and McNary

The seasonal average flow objective for Lower Granite is to be based on the June final water supply forecasts, but the seasonal average flow objective for McNary is a fixed 200 kcfs regardless of the runoff forecasts. Summer flow objectives based on the June final April-July runoff forecast are shown in Table 7.

Table 7. Biological Opinion's Summer Flow Objectives

Lower Granite	Lower Granite	McNary	McNary
Period	Flows (kcfs)	Period	Flows (kcfs)
6/21-8/31	50	7/1-8/31	200

At this time the amount of water available for summer flow augmentation has not been determined.

In 1995, 1996, 1997 and 1998, the Libby-Arrow swap was executed, which made it possible for Libby to stay full more weeks into the summer. It was not executed in 1999 and 2000. The potential for repeating this beneficial, volume neutral operation will be reexamined in 2001, since it is now part of the Libby Coordination Agreement with Canada. The exchange, if it occurs, will be fully documented. Provisions are in place in the DOP to provide for the optimal balancing of the storage of water in Libby and Arrow reservoirs, considering mutually beneficial power and non-power objectives. Storage and/or release rates may be modified at the appropriate reservoir should such modifications be necessary to protect fish or accommodate other operating constraints. Water stored in the Libby Account will be released later, according to a schedule agreed to by the U.S. and Canadian parties, and taking into account the project considerations on Canadian Treaty and Libby reservoirs as well as operation of Kootenay Lake under the International Joint Commission order. BPA and the Corps will coordinate Treaty operations with TMT.

Summer Reservoir Interim Draft Limits

- The interim draft limits specified in the 2000 BiOp on reservoir elevations through August 31st are shown in Table 8 and are independent of the June 30th reservoir elevations. Low water supply this year may change the numbers shown in Table 8. Details have not been determined yet.

Table 8. BiOp Interim Summer Reservoir Draft Limits (in feet) Through August 31

Grand Coulee	Banks Lake	Libby	Hungry Horse	Dworshak
1280/ 1278 1	1565	2439	3540	1520

Notes 1 Grand Coulee Draft limit depends on the July final April-to-August runoff volume forecast at The Dalles Dam. If the forecast is less than 92 MAF GCL can be drafted to 1278 feet. The current April – August forecast is 49.0 MAF.

Upper Snake River Reservoir Operation

Reclamation will provide flow augmentation water from the Payette, Upper Snake and Lemhi River Basins. The exact amount and sources of the water has not yet been determined. Releases will be from a combination of rentals, natural flow and Reclamation space. There is likely to be very little rental water available in 2001, and little of Reclamation's storage space has been filled. Power head will not be used in 2001 because it is not desirable to shut down hydropower facilities in the midst of the ongoing power emergency. Delivery of water through Brownlee Reservoir is uncertain at this time.

Table 9. Potential Sources for 2001 Water for Snake River Flow

Source	Acre-Feet	Notes
Oregon	17,847	Oregon natural flow rights.
Lemhi for 2001 only	6,000	USBR will lease natural flow rights .
Payette	30,000	USBR storage in mine pool and minimum flow.
Upper Snake	4,700	USBR storage .
Shoshone-Bannock	38,000	Shoshone-Bannock tribes rental pool.

Summer Reservoir

Operations

Details have not been set yet for summer operations.

During the July - August period Dworshak will draft to as low as elevation 1520 feet. Note that this depends on the maximum allowable outflow. The maximum outflow without exceeding 110% and 120% TDG is about 14 and 22 kcfs respectively.

Albeni Falls will be full by the end of June and will pass inflow through July and August.

Reclamation will operate Grand Coulee and Hungry Horse consistent with the Biological Opinion and its stated limits of 1280/1278 feet and 3540 feet, respectively, at these reservoirs. The 2000 USFWS BiOp sets the minimum flow requirements at Columbia Falls based on the March final runoff forecast for Hungry Horse Reservoir for the period of April 1 to August 31. The April – August forecast is 1.20 MAF, based on the latest Bureau of reclamation forecast. The minimum flow level at Columbia Falls will be 3206 cfs.

Reclamation will also attempt to reach IRC elevations at Hungry Horse depending on circumstances of runoff, with a higher priority for meeting the Biological Opinion flow objectives.

Summer Spill for Fish Passage

Planning dates for summer spill, where applicable, are 21 June to 31 August for the Snake River, and 1 July to 31 August for the lower Columbia River.. Summer spill requirements/limitations will be as shown previously for spring spill. Summer spill is only required at Ice Harbor, John Day, The Dalles and Bonneville. Daily spill periods are 24 hours at Ice Harbor, The Dalles and Bonneville. At John Day spill hours are 1800 – 0600 hours during 20 April – 14 May and 1900-0600 hours during 15 May 31 July and 1800-0600 hours during 1 August – 31 August). Due to the low flows this year exact details of this year summer spill (if any) have not been set yet.

VII. Fall Operations (September – start)

Operation for Chum Salmon Spawning in the Ives Island Area Below Bonneville Dam

This operation will be implemented as described below if the best hydrologic data available by mid-September indicate that precipitation, runoff, and reservoir storage are likely to support the operation from the start of spawning (late October or early November) until the end of emergence (generally through the start of the spring flow

augmentation season in April) without adverse effect on implementation of the 2000 BiOp, or the ability of parties to comply with the Vernita Bar agreement. The goal is to make sure that providing the flows for Chum salmon spawning will not jeopardize refilling the storage projects to April flood control elevations or meeting the seasonal flow objectives. If these conditions cannot be met, the TMT will recommend operations that will provide benefits to chum salmon while maintaining existing fish protection measures (i.e., 1995 BiOp, 1998 supplemental biological opinion, and Vernita Bar agreement).

If the operation is feasible (as described above), it will begin when chum salmon appear in the area around Ives and Pierce islands, but no later than November 1st. Based on recommendations developed by NMFS from information provided by the regional fish and wildlife managers, TMT proposes to manage FCRPS storage with natural flow to achieve a 125 kcfs average daily discharge (5 kcfs range) from Bonneville Dam from 1 November through 31 December

When reservoir storage, baseflows, and predicted hydrologic conditions permit, a higher managed daily average discharge may be adopted. The TMT will recommend the actual managed daily average discharge with a 5 kcfs range.

Control of water level in spawning areas through regulation of tailwater elevation at Bonneville Dam will be considered if needed to protect spawning chum salmon.

At managed daily average flows of 160 kcfs or higher, the FCRPS will be managed to provide an instantaneous minimum discharge of 155 kcfs (i.e., 160 kcfs minus 5 kcfs) at Bonneville Dam, with a day average of at least 160 kcfs. In this case, the maximum instantaneous discharge would not be limited. Nighttime flows may be higher if needed to pass river flows while keeping daytime water levels lower, to limit access to high elevation habitats while chum are spawning.

During incubation and emergence (January 1st through the start of the spring flow augmentation program for the lower Columbia River on 10 April), TMT proposes to manage storage with natural flows to maintain the daily average discharge from Bonneville Dam needed to protect the highest redd established by the operation and to maintain connectivity between spawning habitat and the mainstem for outmigrants. If the daily average Bonneville outflow is between 125 kcfs and 134 kcfs during spawning, a discharge of at least 125 kcfs will be maintained through incubation and emergence. For all managed spawning flows of 135 kcfs and above, the highest spawning flow minus 10 kcfs will be the managed daily average discharge during incubation and emergence. The highest managed daily average discharge that will be provided during the incubation and emergence period is 150 kcfs.

VII Water temperature

Water quality standards have been developed by the states and tribes under the authority of the federal Clean Water Act to restore and maintain the chemical, physical, and biological integrity of the waters of the United States. High water temperature is a basin-wide issue involving tributaries and mainstem watercourses and impoundments. The TMT recognizes that water temperature is important to the survival of fish and other aquatic life forms, and will recommend that every effort be made to meet the state and tribal water quality standards in the mainstem.

2001 Actions

Timely summer drafts of cold water from Dworshak, as done in the previous years, ~~is being~~^{will} be considered in 2001 to lower water temperatures in the lower Snake River. This will be accomplished in close coordination with the NMFS, USFWS, Idaho Department of Fish and Game, and the Nez Perce Tribe to ensure that the water temperature requirements of the Clearwater River fish hatcheries and rearing conditions in the Clearwater River are taken into account. This operation ~~is being~~^{will need to be} closely coordinated with flow augmentation from Brownlee Reservoir, in consultation with the USFWS and other salmon management agencies, to ensure that optimum use is made of both of these reservoirs. In the past, a release temperature of 50 degrees F. range (+or - 5 degrees F.) has been found acceptable by all parties. Unless otherwise agreed to by USFWS, Idaho Department Of Fish and Game, and the Nez Perce Tribe, use of a similar water temperature level is anticipated for 2001.

The need for decreasing water temperature in fishways will be considered based on the results on-going mainstem adult passage studies. Real-time temperature monitoring in the lower Columbia and lower Snake Rivers will be continued as a part of the on-going, system-wide TDG monitoring program. Temperature monitoring in adult fishways will also continue. The emergency plan to address high water temperature incidences at McNary will be reviewed in the light of past experience in consultation with the salmon managers and other interested parties.

Additional activities for 2001¹⁹ may also emerge as a result of on-going consultations and discussions between EPA, the states of Oregon, Idaho and Washington, and the Corps in an effort to develop a long-term strategy regarding water quality standards for TDG and water temperature.

IX. Total Dissolved Gas Management

The Corps intends to provide voluntary spill for fish passage as called for in the NMFS BiOp, subject to further coordination through TMT given the below average runoff volume forecast and power system needs. ~~The Dalles will spill at a 40% level. A study at John Day will evaluate daytime spill at a 30% level or 0% level.~~

~~Bonneville will spill to the 75 kfs daytime cap to reduce adult fallback and spill at night to the 120%/115% TDG cap.~~

The spill limitation to not exceed 115/120% TDG ~~is being~~ ~~will be~~ met by specifying an appropriate spill cap depending on the project's propensity to create TDG. This spill cap ~~is being~~ ~~will be~~ adjusted in-season based on actual TDG readings and coordinated through TMT. A spill priority list will be developed and implemented, based on relevant information, including real-time and predicted TDG, flow, biological monitoring, and fish movement. The concept of the spill priority is illustrated in Figures 3 and 4.

TDG management options are limited. More water can be stored in the reservoirs behind the dams; the quantity of spill can be shifted to various periods within the day; more water can be put through the turbines; spill can be shifted within the system to avoid excessive local concentrations; spill can be transferred outside the system; and spill bays can be used more effectively. The TMT will work with the Water Quality Team (WQT) to explore other tools available to the TMT for ~~water temperature and~~ TDG reduction across the season.

Beside the spill priority list, changing the spill from a crown to an uniform pattern, avoiding the use of spillway bays without deflectors, and allowing turbine units to operate outside their 1% peak efficiency flow range are additional management options. Proper scheduling of service and maintenance time tables, identifying additional energy loads to serve, and displacing available thermal projects that are serving the same loads also help relieve the need for spill.

Normal operations and others that are required by research, construction, unit maintenance and services, etc. at COE and Reclamation projects will be managed to avoid causing TDG saturation levels above state standards to the extent feasible.

The COE and Reclamation will continue to monitor dissolved gas in the forebay and tailwater areas of all their mainstem Columbia and Snake Rivers projects and make them available to all interested parties through the TMT homepage. Other dams where spill is frequently scheduled will also be monitored. Winter monitoring may also be implemented below selected projects to establish baseline data. The COE will continue to develop and test regional dissolved gas abatement strategies and monitor their effects on the ecosystem in the framework of overall water resources management. Appendix 1 provides more detailed information and discussions on total dissolved gas management in 2001.

Draft June 27, 2001

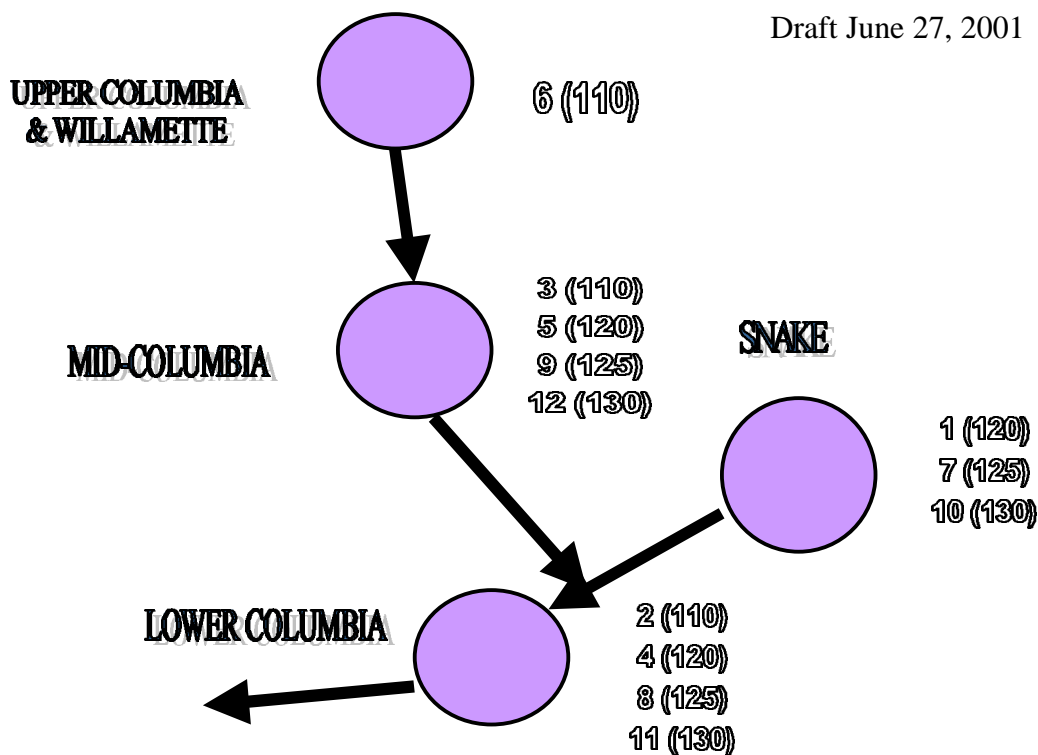


FIGURE 3
SPILL PRIORITY FOR APRIL 3 -
JUNE 20
Priority (% TDG)

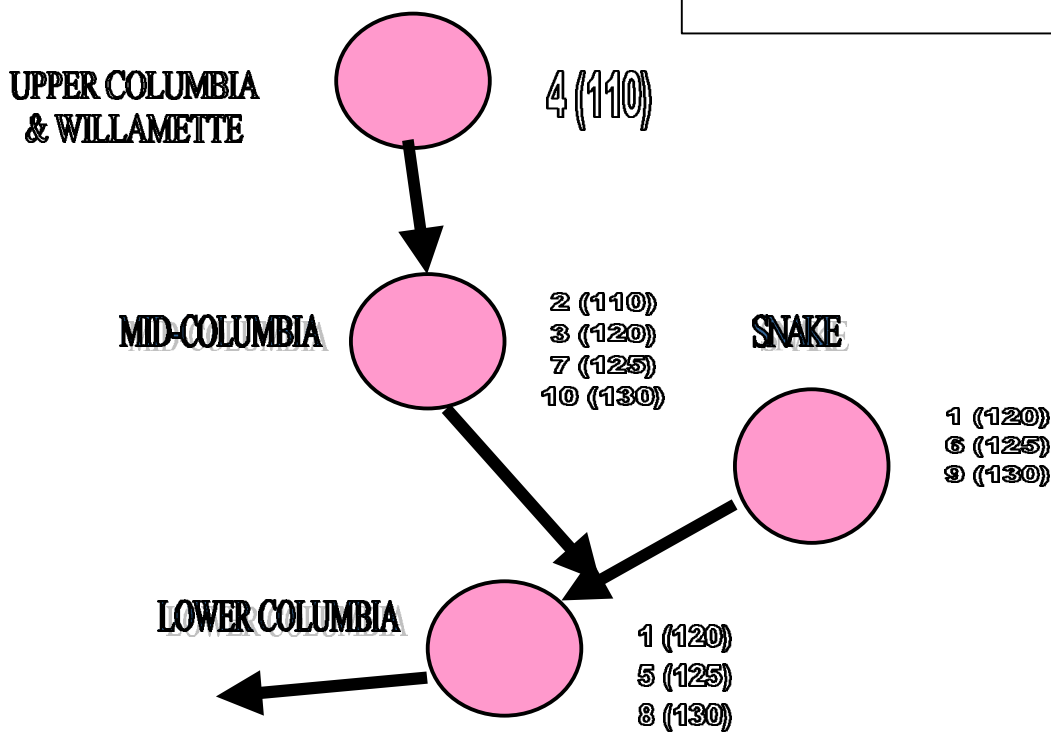


FIGURE 4. SPILL PRIORITY FOR
JUNE 21-AUGUST 31
Priority (% TDG)

X. Transportation

Juvenile fish transportation will occur as outlined in the 2000 NMFS according to procedures described in the Corps of Engineers Fish Passage Plan, Appendix B, dated February 2001. This will include fish collection and transportation in the spring and summer at Lower Granite, Little Goose, and Lower Granite Dams, and in the summer at McNary. TMT will evaluate biological, hydrologic, and water quality information to determine a date to initiate summer transportation at McNary. Because of the low flow conditions this year along with the associated poor inriver conditions for juvenile fish the Corps goal has been to maximize juvenile fish transport at the four lower snake dams. Also because of the low flow conditions and [a much-reduced lower Columbia River spill program](#) ~~a desire to study spring transport at McNary Dam.~~ Juvenile fish have been collected and transported every other day this spring. Summer transport at McNary began June 16th this year.

Comments have been offered by the Independent Scientific Advisory Board (ISAB) and IDFG the ISAB stated that spill is provided in the spring at Snake River collector projects to "spread the risk" between transportation and in-river migration. The objective of transport is "not recommending any specific proposition to limit transported fish. Rather, we [ISAB] were recommending that transportation not be maximized..."

IDFG recommends that the TMT should retain the flexibility to manage smolt transportation operations based on the real-time needs and performance of the fish, and the real-time conditions of the river. Spill is not used just to "spread-the-risk", it is primarily used to help optimize dam passage conditions for in-river migrants.

Oregon recommends a spread-the-risk transport policy for Snake River fall chinook with transport of no more than 50% of fish. As before, the transportation collector projects will operate to maximize collection and transportation (i.e., no voluntary spill except as needed for approved research) during the summer migration.

In general, the switch from spring to summer spill operation will occur on or about June 20. In practice, the TMT has the discretion to make the switch earlier or later based on monitoring of in-river conditions. When more favorable spring-like flows (220 kcfs or greater at McNary) and temperatures (less than 62 deg. F. McNary) either end before or extend after June 20, the actual date to end spill at collector projects should be modified, continuing to spread the risk of transport versus in-river passage for spring migrants so long as favorable flow and temperature conditions persist.

XII. Operations for Research & Other Activities

Project operations planned in conjunction with the activities listed below will be discussed and coordinated at the weekly TMT meetings as needed. In general, conduct of research at mainstem projects will be subordinate to the higher priority of ensuring the best possible downstream passage conditions for listed species. Details of project operations for fishery purposes at Corps projects are provided in the COE Fish Passage Plan. Special operations with potential impact to project performance are listed in Table 10. Implementation details may need to be worked on a case-by-case basis, based on specific river operation requirements for the specific activity, real-time river conditions and applicable test requirements, if any.

A significant amount of the research originally scheduled for this water year has been postponed due to lack of spill and low water conditions. The table below list the special operations that have occurred so far this year to support research.

Table 10. Operational Requirements and Dates for Research and Other Activities at Projects in 2001.

Project	Activity	Operational Requirements	Start/End Date
Bonneville	Spring Creek NFH Release	50 kcfs spill for three days from 1800- 0600	3/10 –3/13
	Orifice Testing	Forebay Restrictions	3/21 – 3/27
	Tribal Fishing	Forebay Restrictions	Various times in April & May
	OPE & FGE Testing	Unit Operating Restrictions	4/24 – 5/23
The Dalles	Fish Passage Study Equipment Repair	Sluiceway & Fish Unit Outages	4/16 - 4/17
	Wasco County Fish Sampling	Forebay Restrictions Tuesday Evenings	5/15 – 8/29
	Juvenile Fish Study	Constant Spill During Day	5/22 – 5/25
John Day	Goose Nesting	High Forebay Every Four Days.	3/21 – 6/2
McNary	Waterfowl Nesting	High Forebay Every Four Days.	3/21 – 6/2
	Lamprey Test	Unit Operating Restrictions	5/21 – 6/2
Lower Granite	FGE Testing	Change In Unit Operating Priorities	5/3 – 6/8

APPENDICES

- **APPENDIX 1: 2001 Total Dissolved Gas Management Plan**
- **APPENDIX 2: Emergency Protocols**
- **APPENDIX 3: BPA's System Load Shaping Guidelines for Operating Turbines Outside 1% Peak Efficiency**
- **APPENDIX 4: TMT Guidelines**
- **APPENDIX 5: Northwest Power Pool 1999 Maintenance Schedule Outages of Generating Units (G:\rcc\tmt99\documents\wmp99_app5.doc)**

USFWS recommends that the scheduled outages of the Hells Canyon Complex projects be included because of their effect on delivery of Snake River flows in the summer. While IDPC is unable to share its maintenance schedule with the TMT, it will share information relevant to TMT on an as needed basis.